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PULSE OXIMETER DERIVED PERFUSION INDEX (PI) AS A NON-INVASIVE PREDICTOR OF HYPOTENSION FOLLOWING SPINAL ANESTHESIA IN LOWER SEGMENT CAESAREAN SECTION

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ABSTRACT

Background: Spinal anesthesia is a preferred technique and provides excellent operating conditions for lower segment caesarean section (LSCS). However, it is commonly associated with hypotension, which can be very deleterious in this patient population. Pulse oximeter derived perfusion index (PI) is an easy to interpret new parameter and is effective to assess peripheral perfusion dynamics and vascular tone. Thus, perfusion index can potentially be used as a non-invasive means to predict the occurrence of severe hypotention in parturients.

Settings & Design: A prospective, observational study, comprising a final sample size of 327 parturients undergoing elective LSCS under spinal anesthesia.

Materials & Methods: Baseline perfusion index of parturients undergoine elective LSCS from December 2017 to May 2019 under spinal anesthesia was recorded. A review & note was made of patients' baseline characteristics. Hemodynamic parameters like non-invasive blood pressure, heart rate, respiratory rate, SpO2 & Perfusin Index (PI) were recorded at 2 minutes intervals after spinal anesthesia upto 20 minutes & then at 5 mins interval till the end of surgery.

Statistical Analysis: The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean ± SD and categorical variables were summarized as frequencies and percentages. Receiver operating characteristic (ROC) analysis was performed to determine the sensitivity and specificity of perfusion index (PI), in order to predict the hypotension at optimal cut-off. A p-value of less than 0.05 was considered statistically significant.

Results: Both the groups recorded episodes of hypotension. The incidence of hypotension in group I was 13.3% (21/158) compared to 73.4% (124/169) in group II. The median phenylephrine requirement in group I was 25 mcg ([IQR] 25–50 mcg) and in group II 75 mcg ([IQR] 50–100 mcg) ($P < 0.001$). The median volume of IV fluids required in group I was 1.2 L (IQR 1.1- 1.3L) and in group II 1.3 L (IQR 1.2 – 1.5 L). ($P < 0.001$). On Karl Pearson's Correlation, a highly significant correlation was found between baseline perfusion index (PI) >3.5 and number of episodes of hypotension (r 0.525, $P < 0.001$), total dose of phenylephrine used (r 0.582, $P < 0.001$) and total IV fluids used (r 0.395, $P < 0.001$). The ROC curve analysis of the data yielded 3.5 as an optimal cut off for predicting hypotension, with sensitivity and specificity of 75.3 % and 85.5 % respectively. The area under the ROC curve (AUC) was 0.791.

Conclusion: perfusion index (PI) can be used as a tool for predicting hypotension in parturients undergoing elective caesarean section under spinal anesthesia, with baseline perfusion index (PI) >3.5 indicating a higher risk of developing hypotension.

KEYWORDS : Spinal anesthesia, lower segment caesarean section, pulse oximeter, perfusion index.

INTRODUCTION

Lower Uterine Segment Caesarean Section (LSCS) is a surgical technique of preference and is commonly performed in present day obstetric practice,[1,2] with spinal anesthesia being a favoured anesthetic technique for the majority of parturients undergoing lower segment Caesarean section, owing to the excellent operating conditions that it provides.[3, 4] Spinal anesthesia offers wide range of advantages like avoidance of airway manipulation, less risk of gastric aspiration, decreased use of depressant anesthetic drugs and less operative blood loss.[5] However it is not totally free of demerits and adverse effects. Hypotension being one of the most frequent adverse effects of spinal anesthesia has an incidence of 15-33% and up to 95% for lower segment Caesarean section.[6, 7] Given the relatively high maternal mortality rate in India and the potential contribution of hypotension thereto,[8] early identification of parturients at particular risk for post spinal anesthesia hypotension is a goal worth pursuing. Several studies have shown hypotension to correlate with maternal and fetal morbidity and mortality with increased incidence of nausea and vomiting in parturients and an increase in the incidence of fetal acidemia.[9,10]

Furthermore, episodes of severe bradycardia and cardiac arrest have been reported in healthy parturients following neuraxial anesthesia.[11]To prevent these adverse effects, empirical administration of IV fluid boluses is usually used, however, hypervolemia can be as deleterious during the perioperative period as is hypovolemia.[12]Early recognition of hypotension and its prompt management are key factors for a favourable surgical outcome. Non-invasive hemodynamic monitoring has permitted clinicians to evaluate changes in heart rate and blood pressure[13, 14] in order to prevent morbidity from severe hypotension following spinal anesthesia. However, beat to beat variation in perfusion dynamics cannot be measured by this method and limits its efficacy. The perfusion index (PI) is derived from the photo plethysmographic waveform (obtained from a pulse oximeter), a waveform based on a signal proportional to infrared light absorption between an emitter and a photo detector. Despite its simple appearance, the pulse oximeter-based photo plethysmographic waveform is a highly complex signal that contains far more information than just a pulse rate (PR).[15]The perfusion index (PI) is the ratio of the pulsatile blood flow (AC component) to the non-pulsatile or static blood in peripheral tissues (DC component), [16, 17] both of which are derived from the amount of infrared (940 nm) light absorbed.[18,19]

$PI = AC \cdot DC \times 100$. [20]

AC: Pulsatile component (Arterial compartment),
DC: Non-Pulsatile component(Other tissues; venous blood, bone, connective tissue)

Perfusion index (PI) can be continuously and non-invasively obtained from a pulse oximeter and it is an easy to interpret new parameter which effectively assesses peripheral perfusion dynamics and vascular tone. Perfusion index (PI) can be an early indicator of sympathectomy

(after neuraxial anesthesia) and proper epidural catheter placement.[21,22] Clinical studies in adult and pediatric patients have demonstrated that an increase in perfusion index (PI) is an early indicator that general and epidural anesthesia has initiated peripheral vasodilatation which typically occurs before the onset of the anesthetic effect.[21, 23] Hence, perfusion index (PI) can be used to assess perfusion dynamics and may be considered a non-invasive method to detect the likelihood for developing hypotension following subarachnoid block (SAB).[24]An ability to predict which parturient will develop severe hypotension would enable adequate preparation in the preoperative phase and could potentially result in alternative treatment regimes. Patients who are likely to develop severe hypotension post spinal anesthesia and who are being managed in a peripheral setting could potentially be referred to areas where specialist anesthetic care is available and supportive high care facilities are readily accessible.[25]

The primary aim of this study was to evaluate the correlation between baseline perfusion index (PI) and incidence of hypotension following spinal anesthesia in lower segment Caesarean section, and the secondary aim was to assess the ability of perfusion index (PI) to predict vasopressor requirement following spinal anesthesia for lower segment Caesarean section. Our hypothesis was that pulse oximetry derived perfusion index can be used to predict occurrence of severe hypotension following spinal anesthesia in LSCS. This study was planned to aid preparedness to deal the occurrence of severe hypotension in obstetric patients undergoing LSCS under spinal anesthesia, based on the outcome of the study.

MATERIALS AND METHODS

This study was undertaken in the Gynecological and Obstetrics division of department of Anesthesiology of a tertiary care hospital in Northern India. This prospective, observational, cross-sectional study was conducted in parturients who underwent elective LSCS from December 2017 to May 2019. The study was conducted according to the declaration of Helsinki after taking consent from all patients whose data were collected.

A time period from December 2017 to May 2019 was selected to conduct the study. During this period, a total of 332 uncomplicated parturients (ASA II) aged 20 to 35 years, posted for elective lower segment Caesarean section under spinal anesthesia were enrolled. However, only 327 parturients completed the study. Parturients with, pre eclampsia, placenta previa, cardiovascular or cerebrovascular disease, gestational diabetes, body mass index ≥40, gestational age <36 or >41 weeks, contraindications to spinal anesthesia, coagulopathy, and Hepatic disorders, were excluded from the study. Parturients were admitted to the preoperative holding area on the morning of their Caesarean delivery. Once parturients were shifted to Operation Theatre (OT) electrocardiography leads, automated NIBP cuff (on right arm), and pulse oximetry probe (on left index finger) were attached for recording baseline values and standard intraoperative monitoring. The perfusion index (PI) was measured in the supine position using a specific pulse oximeter probe (MASIMO MightySat Rx® P/N 9707 pulse oximeter probe; Masimo Corp., Irvine, CA, USA) which was attached to the left index finger of all parturients to ensure uniformity in measuring perfusion index (PI) values. Baseline perfusion index (PI) values were recorded with extreme care to avoid patient movement and parturients were counselled before taking them up for surgery to allay anxiety as these factors could easily change the perfusion index (PI) values. Those with a baseline perfusion index of ≤3.5 were placed in group I and those with a perfusion index of >3.5 in group II.

Spinal anesthesia was performed by an anesthesiologist with Quincke's 27-gauge spinal needle (B-Braun Medical, Inc., Bethlehem, PA) in sitting position with a total of 10 mg of 0.5% hyperbaric bupivacaine and 25 µg fentanyl (total volume 2.5 ml) at the L3–L4 or L4–L5 inter vertebral space. The parturients were returned to the supine position with a left lateral tilt of 15° to facilitate left uterine displacement. The MASIMO Mighty Sat Rx® pulse oximeter probe was reconnected, to monitor the patients till the end of surgery. Oxygen was given through face mask at 6 L/minute for the entire duration of surgery. Ringer's lactate was administered at a rate of 130 ml/10 minutes. The level of sensory block was checked four minutes after the spinal injection with a cold swab. The parturients in whom T6 level of sensory block was not achieved, were excluded from the study and managed according to institutional protocol. Hemodynamic parameters like NIBP, heart rate (HR), respiratory rate (RR), SpO2 and perfusion index (PI) were recorded at 2 minutes intervals after the subarachnoid block (SAB) up to 20 minutes and then at 5 minutes intervals till the end of surgery.Hypotension was defined as mean arterial pressure (MAP) <65 mm Hg and treated with IV bolus of 25 mcg injection phenylephrine and 100 ml RL IV bolus. The first 60 minutes following spinal anesthesia were considered for anesthesia-induced hypotension. Bradycardia was defined as HR <55 beats/minute and treated with injection atropine 0.5 mg IV bolus. Injection oxytocin 2.5 units was given as uterotonic at the delivery of baby, followed by 20 to 80 unit/hour as a separate infusion. Apgar score was recorded at 1st and 5th minute following delivery of baby. Parturients requiring additional oxytocics and/or additional surgical interventions were excluded from the study. Other symptoms like nausea, vomiting were recorded if present. Parturients were asked to rate the severity of their nausea at 5, 10, and 15 minutes after spinal injection and at the end of the surgery using an 11-point verbal rating scale (0 = no nausea, 10 = worst possible nausea).They were also asked to report nausea occurring at any other time during the procedure. Intraoperative nausea or vomiting occurring immediately before or after a 20% reduction in maternal systolic blood pressure was attributed to hypotension. Intraoperative nausea or vomiting not related to hypotension was treated with injection ondansetron 4 mg IV.

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean ± SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar, line diagrams and box plots. Student's independent t-test or Mann Whitney U-test, whichever appropriate was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing categorical variables. Receiver operating characteristic (ROC) analysis was performed to determine the sensitivity and specificity of perfusion index (PI), in order to predict the hypotension at optimal cut-off. A P-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 332 parturients were enrolled for the study, 5 parturients were excluded and data from 327 parturients was used for final analysis. They were divided into two groups on the basis of baseline perfusion index (PI), with PI of 3.5 taken as cutoff level, Out of 327 parturients 158 parturients fell in group I with baseline perfusion index (PI) of ≤3.5 and 169 parturients fell in group II with baseline perfusion index (PI) of >3.5.

The groups were comparable on the basis of demographic data like, age, weight, and height [Mean (±SD) age 27.53 (±4.51) years in group I and 27.89 (±4.48) years in group II (P value = 0.467): mean (±SD) weight of 62.6 (±6.91) kg and 63.7 (±7.18) kg in group I and group II respectively(P value = 0.139); mean (±SD) height 152.5 (±8.87) cm in group I and 153.4 (±8.95) cm in group II (P value = 0.273)]. **Table 1**

Table 1: Baseline Characteristics Of Patients

Parameter	Group I (PI≤ 3.5)	Group II (PI≥ 3.5)	P-value
Age	27.53 (±4.51)	27.89 (±4.48)	0.467
Weight	62.6 (±6.91)	63.7 (±7.18)	0.139
Height	152.5 (±8.87)	153.4 (±8.95)	0.273

The two groups were comparable in terms of other observations also.The duration of surgery in two groups was comparable with mean (±SD) duration of 60.5 (±6.61) minutes and 59.8 (±6.22) minutes in group I and group II respectively (P value = 0.328). The gestational age of parturients in two groups was comparable with mean (±SD) gestational age of 37.92 (±1.389) weeks and 38.17 (±1.417) weeks in group I and group II respectively (P value = 0.121). The median level of cephalad spread of sensory block in both groups was T6 (Range T4–T6) (P value = 0.632). In group I mean (± SD) perfusion index was 3.01 (±0.422) while in group II mean (± SD) perfusion index was 4.61(±0.927), with range of 3.1-3.5 in group I and 4.3-7.4 in group II. **Table 2**

Table 2: Other Baseline Patient Parameters

Parameter	Group I	Group II	Remarks
Mean duration of surgery (Minutes)	60.5±6.61	59.8±6.22	P-value 0.328
Mean gestational age	37.92±1.389	38.17±1.417	P-value 0.121

(Weeks)			
Median level of block	T6 (T4-T6)	T6 (T4-T6)	P-value 0.632
Baseline perfusion Index	3.01±0.422 (3.1-3.5)	4.61±0.927 (4.3-7.4)	---

Both the groups recorded episodes of hypotension, as evident from the Mean Arterial Pressure (MAP) graph. The difference in MAP (between two groups) was significant from the 2nd minute and was very significant from 6th minute onwards.**(Figure 1)** . The incidence of hypotension in group I was 13.3% (21/158) compared to 73.4% (124/169) in group II. This was clinically and statistically highly significant (P < 0.001).**(Figure 2)**

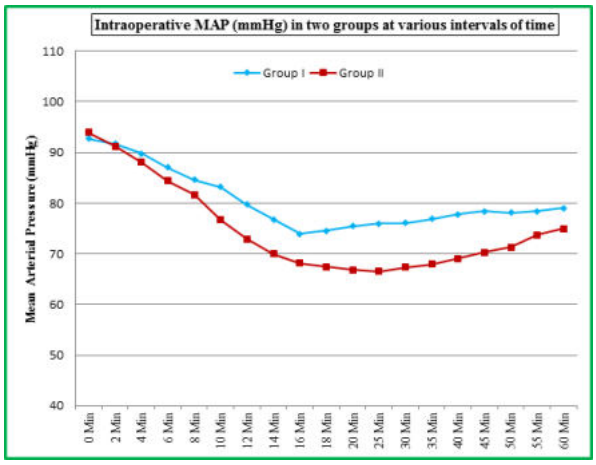

Figure1: Comparison Of Mean Arterial Pressure Between Two Groups

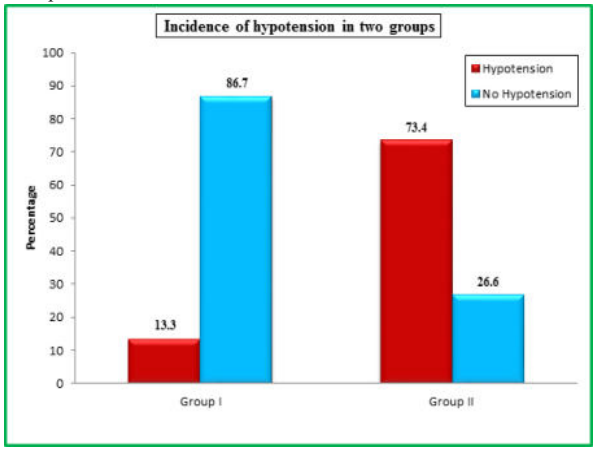

Figure 2: Incidence of hypotension in two groups.

Both groups recorded incidences of hypotension, however, greater number of hypotensive episodes were recorded in Group II. 17 patients of group I had one episode of hypotension, 3 patients had two episodes, and 1patient had three episodes of hypotension. In group II, 31 patients had one episode of hypotension, 40 patients had two episodes, 29 patients had three episodes, and 24 patients had four episodes of hypotension. 87% of patients in group I had no hypotension as compared to 27% of patients in group II who had no episodes of hypotension (P < 0.001). **(Table 3)**

Table 3 : Number Of Episodes Of Hypotension In Two Groups.

Episodes of hypotension	Group I		Group II		P-value
	N	%age	n	%age	
0	137	86.7	45	26.6	<0.001*
1	17	10.8	31	18.3	
2	3	1.9	40	23.7	
3	1	0.6	29	17.2	
4	0	0.0	24	14.2	
Total	158	100	169	100	

The median phenylephrine requirement in group I was 25 mcg ([IQR] 25–50 mcg) and in group II 75 mcg ([IQR] 50–100 mcg) (P < 0.001). The median volume of IV fluids required in group I was 1.2 L (IQR 1.1-1.3L) and in group II 1.3 L (IQR 1.2 – 1.5 L). (P < 0.001). **(Table 4)**

Table 4: Intraoperative Phenylephrine & IV Fluid Requirement

Parameter	Group I	Group II	P-value
Phenylephrine requirement	25(25-75)	75(25-150)	<0.001
Iv fluid requirement	1.2(1.1-1.6)	1.3(1.1-1.8)	<0.001

On Karl Pearson's Correlation we found highly significant correlation between baseline perfusion index (PI) >3.5 and number of episodes of hypotension (r 0.525, P < 0.001), total dose of phenylephrine used (r 0.582, P < 0.001) and total IV fluids used (r 0.395, P< 0.001). **(Table 5)**

Table 5: Correlation Of Baseline Perfusion Index (PI) With Number Of Episodes Of Hypotension, Total Dose Of Phenylephrine And Total IV Fluids Required.

Variable	Karl Pearson's Correlation	P-value
No. of episodes of hypotension	0.525	<0.001*
Total dose of phenylephrine	0.582	<0.001*
Total Intravenous (IV) fluids	0.395	<0.001*

The ROC curve analysis of the data yielded 3.5 as an optimal cut off for predicting hypotension, with sensitivity and specificity of 75.3 % and 85.5 % respectively. **(Table 6)** The area under the ROC curve (AUC) was 0.791. **(Figure 3)**

Table 6: Diagnostic Accuracy Of Baseline Perfusion Index (PI) To Predict Hypotension

Optimal Cutoff	Sensitivity %	Specificity %	AUC	95% Confidence Interval (CI)	P-value
3.5	75.3	85.5	0.791	0.742-0.833	<0.001

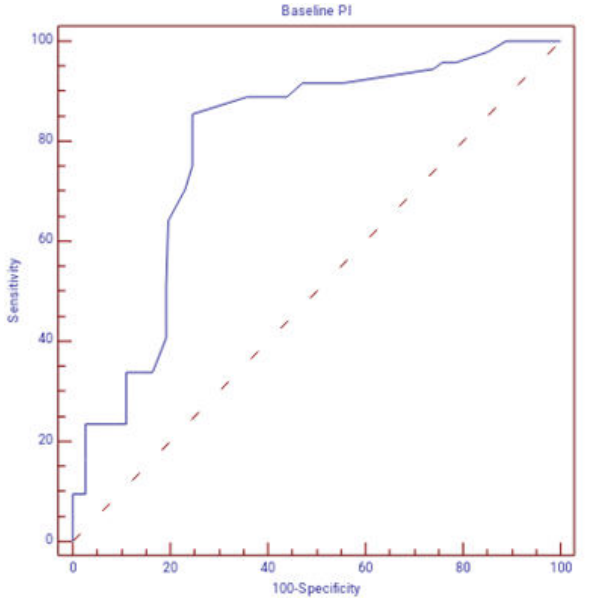

Figure 3: ROC Curve depicting Baseline PI against incidence of hypotension

DISCUSSION

Post spinal anesthesia hypotension is by far the most common complication of spinal anesthesia.[6,7] Although many parameters have been studied to predict the occurence of hypotension after spinal anesthesia for Caesarean section,[26] there is no definite monitoring system which may predict its likelihood. Pulse oximeter derived perfusion index (PI) is an easy to interpret and a relatively new parameter which non-invasively and effectively assesses peripheral perfusion dynamics and vascular tone.[27] The primary aim of this work was to find out the correlation between baseline perfusion index (PI) and the incidence of hypotension following spinal anesthesia and the ability of perfusion index (PI) to predict vasopressor requirement following spinal anesthesia for lower segment Caesarean section. In this observational study, a total of 332 parturients were enrolled, 5 participants were excluded from the study as 1 parturient required additional doses of oxytocin, another parturient developed PPH (post-partum hemorrhage) hence excluded and 3 others were excluded from the study due to inadequate level of the spinal block. Spinal anesthesia had to be repeated in 2 of them while 1 was converted to GA. Only 327 parturients made it to the final analysis, these parturients were divided

into two groups based on baseline perfusion index(PI). Group I comprised 158(PI≤3.5) parturients and group II 169(PI>3.5) parturients.

The mean perfusion index (PI) was 3.01 (Range 2.1-3.5) in group I and 4.61 (Range 4.3-7.4) in group II. In the study by Toyoma et al. baseline perfusion index (PI) ranged from 0.7 to 8.6, with a mean value of 4.0 (2.3).[24] While in the study by Duggappa D. R. et al. the median perfusion index (PI) in group I was 2.45 (IQR [1.8–2.8]), and in group II was 5.4 (IQR [4.25–7.1]).[28] Based on the analysis of compiled data, a statistically significant difference was noted between the two groups with respect to mean arterial pressure (MAP), the difference in mean arterial pressure (MAP) was significant from the 4th minute onwards, with average MAP (± SD) 89.73 ± 5.24 mmHg in group I and 88.06 ± 4.92 mmHg in group II; (P value 0.003) and was very significant from 6th minute onwards, average MAP (± SD) 87.04 ± 6.56 mmHg in group I and 84.42 ± 5.14 mmHg in group II; (P value < 0.001). In the study by Duggappa D. R. et al.[28] the difference between the two groups with respect to mean arterial pressure (MAP) was statistically significant for the first 25 minutes. The difference in MAP was most significant during the 2nd, 4th, 6th, 10th, 15th, 20th and 25th min, with MAP values being lower in group II than in group I. Similar study conducted by Toyoma et al. demonstrated a significant decrease in mean blood pressure after spinal anesthesia in parturients with both high and low baseline perfusion index (PI). However, parturients with high baseline perfusion index (PI) had larger decreases in MAP at 4th, 5th, and 6th minutes after spinal injection than those with low baseline perfusion index (PI).[24]

The analysis of the collected data indicated a higher incidence and severity of hypotension in parturients who had higher baseline perfusion index (PI >3.5) as was observed in a study by Duggappa D. R. et al. The observed incidence of hypotension in our study was 13.3% and 73.4% in group I and group II respectively and the difference was statistically significant between the groups (P value < 0.001), the incidence of hypotension observed by Duggappa D. R. et al. in group I was 10.5 % and in group II 71.42 %.[28] Toyoma et al. observed 25 % and 82 % incidence of hypotension in group I and II respectively.[24] This difference in incidence of hypotension may be due to the difference in sample size, baseline volume status of the parturients and hours of fasting. In our study, 17 patients of group I had one episode of hypotension, 3 patients had two episodes, and 1patient had three episodes of hypotension. In group II, 31 patients had one episode of hypotension, 40 patients had two episodes, 29 patients had three episodes, and 24 patients had four episodes of hypotension. 87% of patients in group I had no hypotension as compared to 27% of patients in group II who had no episodes of hypotension (P < 0.001). In the study conducted by Duggappa D. R. et al. there were no episodes of hypotension in 51 parturients, 4 parturients had one episode of hypotension and 1 parturient each had two and three episodes of hypotension in group I. In group II 18 parturients had no hypotension while 24 parturients had a single hypotensive episode, with two episode of hypotension recorded in 16 subjects and three episode in 4 parturients.[28] 1 parturient had four episodes of hypotension as reported by Duggappa D. R. et al.[28]

The requirement of vasopressors was also found to be higher in parturients whose baseline perfusion index (PI) value was greater than 3.5, with median dose of phenylephrine 25mcg and inter-quartile range 25-50mcg in group I and median of 75mcg and inter-quartile range 50-100mcg in group II (P < 0.001). In this study, the consumption of IV fluid was higher in group II as compared to group I, with median of 1.2 L [IQR 1.1-1.3 L] in group I and 1.3 L [IQR 1.2-1.5 L] in group II, (P < 0.001). In the study by Duggappa D. R. et al. dose of ephedrine used in group I was significantly lower than used in group II with median (and IQR) of 0.00 (0-0) mg and 6.0 (0-12) mg in group I and II respectively.[28] Fluid requirement also varied significantly between the groups in study by Duggappa D. R. et al. with median (IQR) 1.0(0.9-1.1) L and 1.1(1.0-1.15) L respectively in group I and II.[28] In this study injection phenylephrine and fluid boluses were used to treat hypotension as such the consumption of IV fluids was higher than in the study by Toyama et al.[24] where only injection phenylephrine was used to treat hypotension.

As revealed by Receiver Operating Characteristic (ROC) curve analysis of the data the perfusion index (PI) distinguished well between the parturients who developed hypotension versus the parturients who did not develop hypotension during Caesarean section under subarachnoid block (SAB). In our study ROC analysis yielded baseline perfusion index (PI) value of 3.5 as the cut off point for predicting parturients at higher risk of developing hypotension after spinal anesthesia for undergoing Caesarean section which is same as in the study by Toyoma et al.[24] However in the study by Duggappa D. R. et al. baseline perfusion index (PI) to predict hypotension as obtained by ROC analysis of data was 3.85.[28] In another study by Regimol V Varghese ROC curve analysis of study data yielded baseline perfusion index (PI) 3.83 as a more appropriate cut-off value for predicting occurrence of hypotension.[29]

In our study, the baseline perfusion index (PI) >3.5 and probability of hypotension were significantly correlating. On Karl Pearson's correlation, a highly significant association was found between baseline perfusion index (PI) >3.5 and number of episodes of hypotension, the total dose of phenylephrine used and total IV fluids used with correlation ratios of 0.525, 0.582 and 0.395 respectively. In this study, the sensitivity and specificity of baseline perfusion index (PI)>3.5 to predict hypotension after spinal anesthesia for lower segment Caesarean section was 75.3% and 85.5% respectively, area under the curve (AUC) was 0.791 and 95% confidence interval of 0.742-0.833. Whereas Toyama et al.[24] found a sensitivity and specificity of 81% and 86%, respectively, for baseline perfusion index (PI) > 3.5 to predict hypotension, the sensitivity and specificity of baseline perfusion index (PI) > 3.5 to predict hypotension was 69.84% and 89.29% respectively in the study by Duggappa D. R. et al.[28]

The main limitation of our study was that, only the baseline perfusion index (PI) values were considered for analysis, and the serial changes in perfusion index (PI) values and its correlation with the incidence of hypotension were not explored. The underlying reasons for variation in base line perfusion index (PI) in otherwise healthy parturients were not explored. Objective assessment of baseline fluid status of parturients was not carried out in this study. Moreover this study was only an observational study and not a randomized controlled trial.

CONCLUSION

Perfusion index (PI) can be used as a tool for predicting hypotension in parturients undergoing elective caesarean section under spinal anesthesia, with baseline perfusion index (PI) >3.5 indicating higher risk of developing hypotension following spinal anesthesia. However more studies are warranted before it can be accepted as a universal non-invasive tool to predict hypotension following spinal anesthesia.

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